REMARKS

Claims 29-36 are presently pending in the application.

Applicant has amended the Title of the Invention Section of the application to more accurately describe the invention as recited in the presently pending process claims. No new matter has been added by this amendment, and entry of the amendment is respectfully requested.

Claim Rejection Under 35 U.S.C. §102(b)

The Examiner has rejected claims 29-30 and 33-34 under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 4,574,263 of Liddiard for essentially the same reasons that the Examiner rejected now canceled claim 23 in the previous Office Action (Paper No. 4). With regard to claim 29, the Examiner adds that Liddiard discloses that metal film masks are used for etching the substrate to make holes, wherein the metals of titanium or platinum or a combination thereof can be used as the metal masks or etching stop layer and also as a diffusion barrier layer.

With regard to claim 30, the Examiner asserts that Liddiard inherently teaches the etching process from the backside of the substrate with the etching stop layer imparting a low thermal mass to the resistor or the detector because all the process constituents are similar to those of the present invention.

With regard to claims 33-34, the Examiner asserts that Liddiard teaches that the etched stop layer is applied by means of high vacuum thermal evaporation or a CVD process, and that the electrically insulating surface comprises silicon nitride and aluminum oxide.

This rejection and the arguments in support thereof are respectfully, but strenuously, traversed for the reasons set forth in detail below.

The present invention is directed to a process for manufacturing a temperature-dependent measuring resistor with low mass, having an electrical conductor path with at least two connection contact pads arranged on an electrically insulating surface of a metal substrate, wherein a portion of the conductor path and of the electrically insulating surface span at least one recess of the substrate in a bridge manner and the conductor path is arranged in a plane, the

process comprising: providing a metal etching stop layer between the metal substrate and the electrically insulating surface of the metal substrate, wherein the metal etching stop layer comprises a material selected from the group consisting of Ti, Pt, Ni, and combinations thereof; providing the metal substrate on its reverse side with a photo-lithographic enamel structuring; and conducting a wet chemical etching from the reverse side of the substrate up to the previously applied metal etching stop layer (claim 29).

Importantly, Liddiard fails to teach or suggest a metal etching stop layer that is provided between a metal substrate and an electrically insulating surface of the metal substrate as recited in claim 29. The Examiner appears to have overlooked this feature, as there is no assertion that the detector of Liddiard has a metal etching stop layer or metal film mask between the substrate 5 and the pellicle 6, which corresponds to an insulating surface. While Liddiard discloses that metal film masks, made of Ti or Pt or combinations thereof, may be used for etching silicon substrates and for bonding pads, the substrates and bonding pads are not provided between the pellicle 6 and the substrate 5 (see col. 3, lines 44-47 and Figs. 2, 4-5). Instead, as clearly shown for example in Fig. 5 of Liddiard, the pellicle 6 is placed directly on the substrate 5 (see also, e.g., col. 4, lines 31-35 and claim 14). If the Examiner maintains this rejection, he is respectfully requested to point out specifically where Liddiard shows this feature.

Additionally, while Liddiard discloses a method for preparing metal substrates, including the surface of the substrate, Liddiard does not disclose providing a metal substrate on its reverse side with a photo-lithographic enamel structuring and conducting a wet chemical etching from the reverse side of the substrate up to a previously applied metal etching stop layer as recited in claim 29. Instead, the metal substrates are prepared by conventional machining techniques, and silicon substrates are prepared by etching (see, e.g., col. 2, lines 57-58 and col. 3, lines 6-11).

For the reasons set-forth above, Liddiard does not teach or suggest conducting a wet chemical etching from the reverse side of a metal substrate up to a previously applied metal etching stop layer provided between the metal substrate and an electrically insulating surface as recited in claim 29. Since claims 30 and 33-34 directly depend from claim 29, Liddiard also does not teach or suggest all of the features of these claims. Accordingly, reconsideration and withdrawal of the § 102(b) rejection is respectfully requested.

Claim Rejection Under 35 U.S.C. §103(a)

The Examiner rejects claim 31 under 35 U.S.C. §103(a) as being unpatentable (obvious) over Liddiard as applied to claims 29-30 and 33-34 above, and further in view of U.S. Patent No. 4,436,593 of Osborne, et al. ("Osborne") for the same reasons the Examiner rejected now canceled claim 25 (claim 25 was rewritten as claim 31) in Paper No. 4. Although the Examiner acknowledges that Liddiard fails to teach spray etching with ferric chloride, the Examiner argues that Osborne teaches that ferric chloride is used to efficiently and selectively etch with an etch-stop.

It is conceded that Osborne teaches spray etching with a solution of $FeCl_3$ utilizing an insulative layer which acts as an etch stop. However, Osborne is directed to providing self-aligned pole tips and, more specifically, to a method of precisely aligning the pole tips of a thin film magnetic head. The method involves preparing a magnetic head which comprises a base 4 used as a support for a three-layer structure consisting of a top metallic layer 1, an insulative spacer layer 2 and a bottom metallic layer 3, such that the metallic layers become the pole tips for the magnetic head (see claim 1, col. 2, lines 26-29 and Fig. 1). Photo-resist is applied to the top metallic layer to establish the shape of the top pole, and the top layer is etched to the insulative layer to form the top pole (see col. 2, lines 30-37 and claim 1). The photo-resist is then removed and the top pole is encapsulated with a protective metal (see col. 2, lines 38-39 and claim 1). The insulative layer is then etched using the top pole as a mask, followed by etching the bottom metallic layer 3 using the top pole and the insulative layer as masks to form the bottom pole (see col. 3, lines 7-9 and lines 29-33, and claim 1).

This method is significantly different from the method of the present invention. Like Liddiard, Osborne does not teach or suggest providing a metal etching stop layer between a metal substrate and an electrically insulating surface of the metal substrate. Osborne also does not provide a metal substrate on its reverse side with a photo-lithographic enamel structuring as in the present invention. Thus, Osborne fails to make up for the deficiencies of Liddiard as discussed above. Accordingly, even if Osborne were properly combinable with Liddiard, which Applicant does not necessarily agree, the combination still fails to teach or suggest important

features of the presently claimed invention. As a result, the rejection of claim 31 based upon Liddiard in view of Osborne is improper and should be withdrawn.

The Examiner also rejects claims 32 and 35 under §103(a) as being obvious over Liddiard. The Examiner acknowledges that Liddiard does not disclose the thickness of the etch stop layer in a range of about 0.1 to 0.6 micrometer but nevertheless rejects claim 32 based on the same arguments presented in support of the rejection of now canceled claim 26 in Paper No. 4. The Examiner also acknowledges, with regard to claim 35, that Liddiard fails to disclose an insulation layer having a thickness of about 0.5 to 10 micrometers, but asserts that Liddiard discloses that the insulation layer is extremely thin for higher thermal resistance. The Examiner concludes that it would have been obvious to one skilled in the art at the time of claimed invention to optimize the same (understood to mean the same thickness), since it has been held that discovering the optimum value of a result effective variable involves only routine skill in the art.

Liddiard fails to teach or suggest all of the features of the presently claimed invention as discussed above. Additionally, there is no suggestion or motivation in Liddiard to modify the method of making the detector in Liddiard in the manner described in the present invention, including the application of an etch stop layer and insulating surface having the thicknesses recited in claims 32 and 35. Applicant has found that heating or cooling a measuring resistor without a metal etching stop layer as described and claimed, breaks the electrically insulating layer because the metal substrate and insulating layer have different coefficients of thermal expansion. Conversely, providing a metal etching stop layer of Ti, Pt, Ni, or combinations thereof between the metal substrate and the electrically insulating surface of the metal substrate reduces failures during heating and cooling of the measuring resistor (see page 4, lines 12-14). Additionally, the method of present invention allows the etch stop layer and insulating surface to have the recited thicknesses thereby resulting in a light and responsive measuring resistor (see page 5, lines 11-23). Thus, even if Liddiard had provided an etch stop layer and insulating surface having the thicknesses recited in claims 32 and 35, there would be no reasonable expectation of successfully providing the measuring resistor of the present invention, as Liddiard fails to teach or suggest providing a metal etching stop layer of Ti, Pt, Ni, or combinations thereof between a metal substrate and an electrically insulating surface.

Accordingly, the obviousness rejection of claims 32 and 35 based on Liddiard is improper and should be withdrawn.

The Examiner rejects claim 36 under §103(a) as being obvious over Liddiard as applied to claims 29-30 and 33-34 above, and further in view of U.S. Patent No. 5,053,740 of Schultz, et al. ("Schultz"). The Examiner acknowledges that Liddiard does not disclose the type of metal substrate used but argues that, since Schultz discloses a variety of stainless steel substrates for providing corrosion resistance and since the claimed alloys are well known standard materials, it would have been obvious to one skilled in the art to employ any commercially available standard metal for the purpose of obtaining a readily available material having corrosion resistance where Liddiard discloses employing a metal.

Schultz describes a temperature sensor for heating ovens which comprises a metal substrate, at least a portion of which is coated with a layer of porcelain enamel (col. 1, lines 43-46). At least one conductive element is deposited on the coated substrate such that a first temperature range is determined as a function of the resistance of the conductive element(s) and a second temperature range is determined as a function of the resistance of the porcelain enamel layer (col. 1, lines 46-54). Nowhere does Schultz describe a method for manufacturing a measuring resistor as presently claimed. Thus, Schultz fails to make up for the any of the deficiencies of Liddiard, as discussed above, including failing to provide a motivation or reasonable expectation of successfully achieving the claimed invention. Accordingly, even if Schultz were properly combinable with Liddiard, which Applicant does not necessarily agree, the combination still fails to teach or suggest important features of the presently claimed invention. As a result, the rejection based upon Liddiard in view of Schultz is improper and should not be applied to claim 36.

In view of the forgoing remarks, Applicant submits that the pending claims (claims 29-36) are patentably distinct from the prior art. Accordingly, reconsideration and withdrawal of the rejections, and an early Notice of Allowance are respectfully requested.

In the event the Examiner does not now believe the application to be in condition of allowance, Applicant respectfully requests an interview with the Examiner to further discuss what clarifications may be necessary for allowance of the claims. Applicant, by and through his undersigned counsel, will contact the Examiner in

approximately two weeks to inquire as to whether it is necessary to schedule an interview with the Examiner.

Respectfully submitted,

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